

Table 1. Draft LWG Mitigation Framework<sup>a</sup> - Active Channel Margin

Remedial Technologies	Active Channel Margin																					
	Sloped (<5:1), unarmored and vegetated (native) <sup>q</sup> (0.4 - 1)	Note ID	Sloped (<5:1), unarmored and unvegetated (0.2 - 0.8) <sup>q</sup>	Note ID	Sloped (>5:1), unarmored and vegetated (native) <sup>j</sup> (0.2 - 0.8)	Note ID	Sloped (>5:1) unarmored and vegetated with invasives (0.1 - 0.6) <sup>o, q</sup>	Note ID	Sloped (<5:1), bio-engineered <sup>q</sup> (0.2 - 0.8)	Note ID	Sloped (>5:1), bio-engineered (0.2 - 0.8)	Note ID	Sloped (>5:1) unarmored and unvegetated (0.1 - 0.3)	Note ID	Covered structures over channel margins (docks) (1/2 value of the margin type)	Note ID	Riprap Concrete or other artificial debris (0.1 - 0.3)	Note ID	Sheetpile (0)	Note ID	Pilings (1 per 100 sq ft) (1/2 value of margin type)	Note ID
Dredging																						
Dredging resulting in a habitat type conversion to deep water (0.1)		-		-		-		o		-		-		-		-		d		d		e
Dredging <b>not</b> resulting in a habitat type conversion (may include capping back over the dredge area with similar substrate type)		-		-		-		o		-		-		-		-		-		-		-
Capping																						
Capping resulting in a <b>significant</b> change in substrate type (i.e., from silt/sand/gravel to large rock) but no change in depth zones <sup>n</sup>		-		-		-		o		-		-		-		-		d		d		e
Capping resulting in a <b>moderate</b> change in substrate type (i.e., from silt/sand/gravel to cobble or material size larger than gravel but smaller than riprap) but no change in depth zones <sup>n</sup>		k		k		k		k		d		d		d		d		k		d		e
Capping that <b>does not</b> result in a significant change in the substrate type (i.e., substrate size remains similar to existing conditions) and no change in depth zones		-		-		-		o		-		-		-		-		-		-		-
Capping that leads to a conversion of deep water to shallow water depth zones and results in a significant change in substrate type (i.e., from silt/sand/ gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A	-	N/A	-
Capping that leads to a conversion of deep water to shallow water depths and <b>does not</b> result in a significant change in substrate type (i.e., from silt/sand/gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A	-	N/A	-
Shoreline Integration <sup>b</sup>																						
Shoreline integration resulting in hardening of the shoreline (i.e., placement of large rock)		f		f		f		f, o		f		f		f		f		f		d		e
Shoreline integration resulting in softening of the shoreline		g		g		g		g, o		g		g		g		-		g		g		e
Shoreline integration that <b>does not</b> result in a change in the shoreline condition		-		-		-		o		-		-		-		-		-		-		-
Enhanced Monitored Natural Recovery (includes in situ treatment)																						
Placement of sand/gravel or smaller substrate for monitored natural recovery		-		-		-		o		-		-		-		-		-		-		-
Over-water and In-water Structures																						
Removal of over-water structures that causes aquatic shading	N/A	-	N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A	-		e	N/A	-	N/A	-	N/A	-
Replacement of over-water structures in a way that reduces the amount of aquatic shading by allowing light to penetrate underneath the structure and that is expected to improve habitat function	N/A	-	N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A	-		-	N/A	-	N/A	-	N/A	-
Removal of existing piles that provide habitat to predators of juvenile salmonids	N/A	-	N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-		e

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	Sloped (<5:1), unarmored and vegetated (native) <sup>q</sup> (0.4 - 1)	Note ID	Sloped (<5:1), unarmored and unvegetated (0.2 - 0.8) <sup>q</sup>	Note ID	Sloped (>5:1), unarmored and vegetated (native) <sup>q</sup> (0.2 - 0.8)	Note ID	Sloped (>5:1) unarmored and vegetated with invasives (0.1 - 0.6) <sup>o, q</sup>	Note ID	Sloped (<5:1), bio-engineered <sup>q</sup> (0.2 - 0.8)	Note ID	Sloped (>5:1), bio-engineered (0.2 - 0.8)	Note ID	Sloped (>5:1) unarmored and unvegetated (0.1 - 0.3)	Note ID	Covered structures over channel margins (docks) (1/2 value of the margin type)	Note ID	Riprap Concrete or other artificial debris (0.1 - 0.3)	Note ID	Sheetpile (0)	Note ID	Pilings (1 per 100 sq ft) (1/2 value of margin type)	Note ID
Confined Disposal Facility Construction/Confined Aquatic Disposal																						
Filling that leads to a conversion of deep water to shallower water depth zones and results in a significant change in substrate type (i.e., from silt/sand/ gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Filling that leads to a conversion of deep water to shallow water depths and does not result in a significant change in substrate type (i.e., from silt/sand/gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Filling aquatic habitat that results in a conversion to upland habitat		-		-		-		o		-		-		-		-		-		-		e

**Notes:**

a This matrix is focused on long-term habitat impacts rather than short-term construction related impacts.The short-term construction related impacts would be dealt with using BMPs that could potentially be employed, and would not require habitat mitigation.

b Shoreline Integration = To successfully integrate a new cap or dredge slope into the shoreline, the shoreline may need to be altered; the need for dredging and capping in the river may result in the need for integration into the higher shoreline for removal or capping of contaminants in the lower shoreline.

d It is assumed that the existing habitat condition will not be further improved or degraded if left in place regardless of the proposed remedial activity. For example, sheetpile and riprap in the active channel margin have a habitat value of 0. The proposed habitat value will remain 0 regardless of what remedial activity is proposed.

e Existing or proposed habitat values depend on the habitat characteristics where the piling or covering structures are or will be located.

f Value could change depending on the type of hardening that occurs. For this table, we assumed the slope would be riprapped.

g Value could change depending on proposed type of softening. For this table we assumed a slope < 5:1 with vegetation and no armoring.

h No existing values are found in the NMFS Expert Panel Table of Relative Chinook Salmon Lower Willamette Habitat Values for hardening off-channel habitats, so the values from the active channel margin were used

i It is assumed that the riprap and covering structures habitat will not be further improved or degraded by placing piling.

k NMFS Expert Panel provided a value of 0.1 for riprap in the shallow water main channel areas. Proposing to add a value of ranging from 0.4 to 0.6 for material sized larger than gravel, but smaller than riprap.

n Sand/silt/gravel = material less than 64 mm in size

o This scenario did not have a value in the Expert Panel table.

p Value will vary depending on what the naturally vegetated habitat types will be hardened to (i.e., vegetated riprap or riprap) or on what the degraded habitat types are softened to.

q sand/gravel material overlying riprap (may need monitoring to confirm it remains in place) gets same values; Riprap with smaller material layered on top, or placed in such a way as to promote natural deposition of sediment would provide habitat value similar to those for given ACM categories

**General Note - For the purposes of the FS, it is assumed that mitigation projects would be implemented within 2 years of the remedial activity and that it would take the habitat 1 year to reach full function.**

Table 1. Draft LWG Mitigation Framework<sup>a</sup> - Main Channel

Remedial Technologies	Main Channel Shallow Water											
	Gravel and finer substrates 0 to 10 ft water from OLW (0.8 - 1) <sup>q</sup>	Note ID	Gravel and finer substrates 10 to 20 ft water from OLW (0.4) <sup>q</sup>	Note ID	Natural rock outcrop (can not be created) 0 to 10 ft water from OLW (0.8 - 1)	Note ID	Natural rock outcrop (can not be created) 10 to 20 ft water from OLW (0.3)	Note ID	Moderate substrate size (rounded rock larger than sand/gravel but smaller than riprap) 0 to 10 ft water from OLW (0.4 - 0.6) <sup>q</sup>	Note ID	Moderate substrate size (rounded rock larger than sand/gravel but smaller than riprap) 10 to 20 ft water from OLW (0.2) <sup>q</sup>	Note ID
<b>Dredging</b>												
Dredging resulting in a habitat type conversion to deep water		-		-	N/A	-	N/A	-		-		-
Dredging <b>not</b> resulting in a habitat type conversion (may include capping back over the dredge area with similar substrate type)		-		-	N/A	-	N/A	-		-		-
<b>Capping</b>												
Capping resulting in a <b>significant</b> change in substrate type (i.e., from silt/sand/gravel to large rock) but no change in depth zones <sup>n</sup>		-		-	N/A	-	N/A	-		-		-
Capping resulting in a <b>moderate</b> change in substrate type (i.e., from silt/sand/gravel to cobble or material size larger than gravel but smaller than riprap) but no change in depth zones <sup>n</sup>		k		k	N/A	-	N/A	-		k		k
Capping that <b>does not</b> result in a significant change in the substrate type (i.e., substrate size remains similar to existing conditions) and no change in depth zones		-		-	N/A	-	N/A	-		-		-
Capping that leads to a conversion of deep water to shallow water depth zones and results in a significant change in substrate type (i.e., from silt/sand/ gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Capping that leads to a conversion of deep water to shallow water depths and <b>does not</b> result in a significant change in substrate type (i.e., from silt/sand/gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
<b>Shoreline Integration<sup>b</sup></b>												
Shoreline integration resulting in hardening of the shoreline (i.e., placement of large rock)	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Shoreline integration resulting in softening of the shoreline	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Shoreline integration that <b>does not</b> result in a change in the shoreline condition	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
<b>Enhanced Monitored Natural Recovery (includes in situ treatment)</b>												
Placement of sand/gravel or smaller substrate for monitored natural recovery		-				-						
<b>Over-water and In-water Structures</b>												
Removal of over-water structures that causes aquatic shading	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Replacement of over-water structures in a way that reduces the amount of aquatic shading by allowing light to penetrate underneath the structure and that is expected to improve habitat function	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Removal of existing piles that provide habitat to predators of juvenile salmonids	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-

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	Main Channel Shallow Water											
	Gravel and finer substrates 0 to 10 ft water from OLW (0.8 - 1) <sup>q</sup>	Note ID	Gravel and finer substrates 10 to 20 ft water from OLW (0.4) <sup>q</sup>	Note ID	Natural rock outcrop (can not be created) 0 to 10 ft water from OLW (0.8 - 1)	Note ID	Natural rock outcrop (can not be created) 10 to 20 ft water from OLW (0.3)	Note ID	Moderate substrate size (rounded rock larger than sand/gravel but smaller than riprap) 0 to 10 ft water from OLW (0.4 - 0.6) <sup>q</sup>	Note ID	Moderate substrate size (rounded rock larger than sand/gravel but smaller than riprap) 10 to 20 ft water from OLW (0.2) <sup>q</sup>	Note ID
Remedial Technologies												
Confined Disposal Facility Construction/Confined Aquatic Disposal												
Filling that leads to a conversion of deep water to shallower water depth zones and results in a significant change in substrate type (i.e., from silt/sand/ gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Filling that leads to a conversion of deep water to shallow water depths and does not result in a significant change in substrate type (i.e., from silt/sand/gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Filling aquatic habitat that results in a conversion to upland habitat		-				-						

Table 1. Draft LWG Mitigation Framework<sup>a</sup> - Main Channel

Remedial Technologies	Main Channel Shallow Water (continued)										Main Channel Deep Water			
	Pilings (1 per 100 sq ft) (1/2 value of main channel type)	Note ID	Shallow water with riprap, concrete or other artificial debris 0 to 10 ft water from OLW (0.1 - 0.5)	Note ID	Shallow water with riprap, concrete or other artificial debris 10 to 20 ft water from OLW (0.1)	Note ID	Shallow water with covering structures (docks) 0 to 10 ft water from OLW (1/2 value of the channel type)	Note ID	Shallow water with covering structures (docks) 10 to 20 ft water from OLW (1/2 value of the channel type)	Note ID	Natural substrates (0.1)	Note ID	Artificial substrates (0.05)	Note ID
<b>Dredging</b>														
Dredging resulting in a habitat type conversion to deep water		e		-		-		-		-	N/A	-	N/A	-
Dredging <b>not</b> resulting in a habitat type conversion (may include capping back over the dredge area with similar substrate type)		-		-		-		-		-		-		-
<b>Capping</b>														
Capping resulting in a <b>significant</b> change in substrate type (i.e., from silt/sand/gravel to large rock) but no change in depth zones <sup>n</sup>		e		-		-		-		-		-		-
Capping resulting in a <b>moderate</b> change in substrate type (i.e., from silt/sand/gravel to cobble or material size larger than gravel but smaller than riprap) but no change in depth zones <sup>n</sup>		e, k		-		-		d		d		-		-
Capping that <b>does not</b> result in a significant change in the substrate type (i.e., substrate size remains similar to existing conditions) and no change in depth zones		-		-		-		-		-		-		-
Capping that leads to a conversion of deep water to shallow water depth zones and results in a significant change in substrate type (i.e., from silt/sand/ gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-		-		-
Capping that leads to a conversion of deep water to shallow water depths and <b>does not</b> result in a significant change in substrate type (i.e., from silt/sand/gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-		-		-
<b>Shoreline Integration<sup>b</sup></b>														
Shoreline integration resulting in hardening of the shoreline (i.e., placement of large rock)	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Shoreline integration resulting in softening of the shoreline	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Shoreline integration that <b>does not</b> result in a change in the shoreline condition	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
<b>Enhanced Monitored Natural Recovery (includes in situ treatment)</b>														
Placement of sand/gravel or smaller substrate for monitored natural recovery	0	-		-				-		-		-		-
<b>Over-water and In-water Structures</b>														
Removal of over-water structures that causes aquatic shading	N/A	-	N/A	-	N/A	-		e		e	N/A	-	N/A	-
Replacement of over-water structures in a way that reduces the amount of aquatic shading by allowing light to penetrate underneath the structure and that is expected to improve habitat function	N/A	-	N/A	-	N/A	-		-		-	N/A	-	N/A	-
Removal of existing piles that provide habitat to predators of juvenile salmonids		e	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-

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Table 1. Draft LWG Mitigation Framework<sup>a</sup> - Main Channel

	Main Channel Shallow Water (continued)										Main Channel Deep Water			
	Pilings (1 per 100 sq ft) (1/2 value of main channel type)	Note ID	Shallow water with riprap, concrete or other artificial debris 0 to 10 ft water from OLW (0.1 - 0.5)	Note ID	Shallow water with riprap, concrete or other artificial debris 10 to 20 ft water from OLW (0.1)	Note ID	Shallow water with covering structures (docks) 0 to 10 ft water from OLW (1/2 value of the channel type)	Note ID	Shallow water with covering structures (docks) 10 to 20 ft water from OLW (1/2 value of the channel type)	Note ID	Natural substrates (0.1)	Note ID	Artificial substrates (0.05)	Note ID
Remedial Technologies														
Confined Disposal Facility Construction/Confined Aquatic Disposal														
Filling that leads to a conversion of deep water to shallower water depth zones and results in a significant change in substrate type (i.e., from silt/sand/ gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-		-		-
Filling that leads to a conversion of deep water to shallow water depths and does not result in a significant change in substrate type (i.e., from silt/sand/gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-		-		-
Filling aquatic habitat that results in a conversion to upland habitat		-		-				-				-		-

Notes:

- a This matrix is focused on long-term habitat impacts rather than short-term construction related impacts.The short-term construction related impacts would be dealt with using BMPs that could potentially be employed, and would not require habitat mitigation.
- b Shoreline Integration = To successfully integrate a new cap or dredge slope into the shoreline, the shoreline may need to be altered; the need for dredging and capping in the river may result in the need for integration into the higher shoreline for removal or capping of contaminants in the lower shoreline.
- d It is assumed that the existing habitat condition will not be further improved or degraded if left in place regardless of the proposed remedial activity. For example, sheetpile and riprap in the active channel margin have a habitat value of 0. The proposed habitat value will remain 0 regardless of what remedial activity is proposed.
- e Existing or proposed habitat values depend on the habitat characteristics where the piling or covering structures are or will be located.
- f Value could change depending on the type of hardening that occurs. For this table, we assumed the slope would be riprapped.
- g Value could change depending on proposed type of softening. For this table we assumed a slope < 5:1 with vegetation and no armoring.
- h No existing values are found in the NMFS Expert Panel Table of Relative Chinook Salmon Lower Willamette Habitat Values for hardening off-channel habitats, so the values from the active channel margin were used (i.e., riprap = 0.1)
- i It is assumed that the riprap and covering structures habitat will not be further improved or degraded by placing piling.
- k NMFS Expert Panel provided a value of 0.1 for riprap in the shallow water main channel areas. Proposing to add a value of ranging from 0.4 to 0.6 for material sized larger than gravel, but smaller than riprap.
- n Sand/silt/gravel = material less than 64 mm in size
- o This scenario did not have a value in the Expert Panel table.
- p Value will vary depending on what the naturally vegetated habitat types will be hardened to (i.e., vegetated riprap or riprap) or on what the degraded habitat types are softened to.
- q sand/gravel material overlying riprap (may need monitoring to confirm it remains in place) gets same values; Riprap with smaller material layered on top, or placed in such a way as to promote natural deposition of sediment would provide habitat value similar to those for the given main channel category

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Table 1. Draft LWG Mitigation Framework<sup>a</sup> - Off-channel Habitat

Remedial Technologies	Off-channel																													
	"Cold" water tributary (1)	Note ID	Side channel (1)	Note ID	Alcove or slough with "cold" tributary (1)	Note ID	Embaymen t (cove) with "cold" tributary (1)	Note ID	Alcove or slough with "warm" tributary (.9)	Note ID	Embayment (cove) with "warm" tributary (.9)	Note ID	"Warm" water tributary (0.9)	Note ID	Alcove or slough without tributary (0.8)	Note ID	Embayment (cove) without tributary (0.8) (0.6 if upstream)	Note ID	Bioengineered (0.2-0.8)	Note ID	Covered structures over off-channel areas (docks)(1/2 value of the channel type)	Note ID	Riprap, concrete or other artificial debris (0.1-0.3)	Note ID	Sheetpile (0)	Note ID	Pilings (1 per 100 sq ft) (1/2 value of off-channel type)	Note ID		
Dredging																														
Dredging resulting in a habitat type conversion to deep water		-		-		-		-		-		-		-		-		-		-		-		d		d		e		
Dredging <b>not</b> resulting in a habitat type conversion (may include capping back over the dredge area with similar substrate type)		-		-		-		-		-		-		-		-		-		-		-		-		-		-		
Capping																														
Capping resulting in a <b>significant</b> change in substrate type (i.e., from silt/sand/gravel to large rock) but no change in depth zones <sup>n</sup>		-		-		-		-		-		-		-		-		-		-		-		-		-		e		
Capping resulting in a <b>moderate</b> change in substrate type (i.e., from silt/sand/gravel to cobble or material size larger than gravel but smaller than riprap) but no change in depth zones <sup>n</sup>		k		k		k		k		k		k		k		k		k		d		d		-		d		e		
Capping that <b>does not</b> result in a significant change in the substrate type (i.e., substrate size remains similar to existing conditions) and no change in depth zones		-		-		-		-		-		-		-		-		-		-		-		-		-		-		
Capping that leads to a conversion of deep water to shallow water depth zones and results in a significant change in substrate type (i.e., from silt/sand/ gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A	-	N/A	-	-	
Capping that leads to a conversion of deep water to shallow water depths and <b>does not</b> result in a significant change in substrate type (i.e., from silt/sand/gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A	-	N/A	-	N/A		N/A	-	N/A	-	N/A	-	N/A	-	-	
Shoreline Integration <sup>b</sup>																														
Shoreline integration resulting in hardening of the shoreline (i.e., placement of large rock)		h, f		h, f		h, f		h, f		h, f		h, f		h, f		h, f		h, f		h, f		h, f		h, f		h, f		d		e
Shoreline integration resulting in softening of the shoreline	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-		g		-		g		g		e		
Shoreline integration that <b>does not</b> result in a change in the shoreline condition		-		-		-		-		-		-		-		-		-		-		-		-		-		-		
Enhanced Monitored Natural Recovery (includes in situ treatment)																														
Placement of sand/gravel or smaller substrate for monitored natural recovery		-		-		-		-		-		-		-		-		-		-		-		-		-		-		
Over-water and In-water Structures																														
Removal of over-water structures that causes aquatic shading	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-		e	N/A	-	N/A	-	N/A	-	-	
Replacement of over-water structures in a way that reduces the amount of aquatic shading by allowing light to penetrate underneath the structure and that is expected to improve habitat function	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-		-	N/A	-	N/A	-	N/A	-	-	
Removal of existing piles that provide habitat to predators of juvenile salmonids	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-			N/A	-	N/A	-	N/A	-			e	

Table 1. Draft LWG Mitigation Framework<sup>a</sup> - Off-channel Habitat

Remedial Technologies	Off-channel																											
	"Cold" water tributary (1)	Note ID	Side channel (1)	Note ID	Alcove or slough with "cold" tributary (1)	Note ID	Embayment (cove) with "cold" tributary (1)	Note ID	Alcove or slough with "warm" tributary (.9)	Note ID	Embayment (cove) with "warm" tributary (.9)	Note ID	"Warm" water tributary (0.9)	Note ID	Alcove or slough without tributary (0.8)	Note ID	Embayment (cove) without tributary (0.8) (0.6 if upstream)	Note ID	Bioengineered (0.2-0.8)	Note ID	Covered structures over off-channel areas (docks)(1/2 value of the channel type)	Note ID	Riprap, concrete or other artificial debris (0.1-0.3)	Note ID	Sheetpile (0)	Note ID	Pilings (1 per 100 sq ft) (1/2 value of off-channel type)	Note ID
Confined Disposal Facility Construction/Confined Aquatic Disposal																												
Filling that leads to a conversion of deep water to shallower water depth zones and results in a significant change in substrate type (i.e., from silt/sand/ gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Filling that leads to a conversion of deep water to shallow water depths and does not result in a significant change in substrate type (i.e., from silt/sand/gravel to large rock) <sup>n</sup>	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
Filling aquatic habitat that results in a conversion to upland habitat		-		-		-		-		-		-		-		-		-		-		-		-		-		e

**Notes:**

a This matrix is focused on long-term habitat impacts rather than short-term construction related impacts.The short-term construction related impacts would be dealt with using BMPs that could potentially be employed, and would not require habitat mitigation.

b Shoreline Integration = To successfully integrate a new cap or dredge slope into the shoreline, the shoreline may need to be altered; the need for dredging and capping in the river may result in the need for integration into the higher shoreline for removal or capping of contaminants in the lower shoreline.

d It is assumed that the existing habitat condition will not be further improved or degraded if left in place regardless of the proposed remedial activity. For example, sheetpile and riprap in the active channel margin have a habitat value of 0. The proposed habitat value will remain 0 regardless of what remedial activity is proposed.

e Existing or proposed habitat values depend on the habitat characteristics where the piling or covering structures are or will be located.

f Value could change depending on the type of hardening that occurs. For this table, we assumed the slope would be riprapped.

g Value could change depending on proposed type of softening. For this table we assumed a slope < 5:1 with vegetation and no armoring.

h No existing values are found in the NMFS Expert Panel Table of Relative Chinook Salmon Lower Willamette Habitat Values for hardening off-channel habitats, so the values from the active channel margin were used (i.e., riprap = 0.0)

i It is assumed that the riprap and covering structures habitat will not be further improved or degraded by placing piling.

k NMFS Expert Panel provided a value of 0.1 for riprap in the shallow water main channel areas. Proposing to add a value of ranging from 0.4 to 0.6 for material sized larger than gravel, but smaller than riprap.

n Sand/silt/gravel = material less than 64 mm in size

o This scenario did not have a value in the Expert Panel table. As such, a value of 0.6 is proposed for this scenario.

p Value will vary depending on what the naturally vegetated habitat types will be hardened to (i.e., vegetated riprap or riprap) or on what the degraded habitat types are softened to.

**General Note - For the purposes of the FS, it is assumed that mitigation projects would be implemented within 2 years of the remedial activity and that the mitigation project would create off-channel habitat, which would take 1 year to reach full function.**

Table 1. Draft LWG Mitigation Framework<sup>a</sup> - Riparian Habitat

Remedial Technologies	Riparian													
	Naturally vegetated forest, <400 ft from ACM and in historic floodplain (0.65)	Note ID	Naturally vegetated forest, <400 ft from ACM (0.5)	Note ID	Naturally vegetated, grass/shrub and associated with historic flood plain (0.35)	Note ID	Naturally vegetated, grass/shrub (0.2)	Note ID	Invasive species (0.1 - 0.3)	Note ID	Vegetated Riprap (0.05 - 0.5)	Note ID	Unvegetated/paved/buildings/riprap (0)	Note ID
<b>Dredging</b>														
Dredging resulting in a habitat type conversion to deep water	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dredging <b>not</b> resulting in a habitat type conversion (may include capping back over the dredge area with similar substrate type)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Capping</b>														
Capping resulting in a <b>significant</b> change in substrate type (i.e., from silt/sand/gravel to large rock) but no change in depth zones <sup>n</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Capping resulting in a <b>moderate</b> change in substrate type (i.e., from silt/sand/gravel to cobble or material size larger than gravel but smaller than riprap) but no change in depth zones <sup>n</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Capping that <b>does not</b> result in a significant change in the substrate type (i.e., substrate size remains similar to existing conditions) and no change in depth zones	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Capping that leads to a conversion of deep water to shallow water depth zones and results in a significant change in substrate type (i.e., from silt/sand/ gravel to large rock) <sup>n</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Capping that leads to a conversion of deep water to shallow water depths and <b>does not</b> result in a significant change in substrate type (i.e., from silt/sand/gravel to large rock) <sup>n</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Shoreline Integration<sup>b</sup></b>														
Shoreline integration resulting in hardening of the shoreline (i.e., placement of large rock)		p		p		p		p		p		-		-
Shoreline integration resulting in softening of the shoreline	N/A	-	N/A	-	N/A	-	N/A	-		p		p		p
Shoreline integration that <b>does not</b> result in a change in the shoreline condition		-		-		-		-		-		-		-
<b>Enhanced Monitored Natural Recovery (includes in situ treatment)</b>														
Placement of sand/gravel or smaller substrate for monitored natural recovery	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Over-water and In-water Structures</b>														
Removal of over-water structures that causes aquatic shading	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Replacement of over-water structures in a way that reduces the amount of aquatic shading by allowing light to penetrate underneath the structure and that is expected to improve habitat function	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Removal of existing piles that provide habitat to predators of juvenile salmonids	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Table 1. Draft LWG Mitigation Framework<sup>a</sup> - Riparian Habitat

Remedial Technologies	Riparian													
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Confined Disposal Facility Construction/Confined Aquatic Disposal														
Filling that leads to a conversion of deep water to shallower water depth zones and results in a significant change in substrate type (i.e., from silt/sand/ gravel to large rock) <sup>n</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Filling that leads to a conversion of deep water to shallow water depths and does not result in a significant change in substrate type (i.e., from silt/sand/gravel to large rock) <sup>n</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Filling aquatic habitat that results in a conversion to upland habitat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

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- b Shoreline Integration = To successfully integrate a new cap or dredge slope into the shoreline, the shoreline may need to be altered; the need for dredging and capping in the river may result in the need for integration into the higher shoreline for removal or capping of contaminants in the lower shoreline.
- d It is assumed that the existing habitat condition will not be further improved or degraded if left in place regardless of the proposed remedial activity. For example, sheetpile and riprap in the active channel margin have a habitat value of 0. The proposed habitat value will remain 0 regardless of what remedial activity is proposed.
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- i It is assumed that the riprap and covering structures habitat will not be further improved or degraded by placing piling.
- k NMFS Expert Panel provided a value of 0.1 for riprap in the shallow water main channel areas. Proposing to add a value of ranging from 0.4 to 0.6 for material sized larger than gravel, but smaller than riprap.
- n Sand/silt/gravel = material less than 64 mm in size
- o This scenario did not have a value in the Expert Panel table.
- p Value will vary depending on what the naturally vegetated habitat types will be hardened to (i.e., vegetated riprap or riprap) or on what the degraded habitat types are softened to.
- General Note - For the purposes of the FS, it is assumed that mitigation projects would be implemented within 2 years of the remedial activity and that the mitigation project would create off-channel habitat, which would take 1 year to reach full function.**

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